CLAIMS

1. A production method of a ferrite material comprising as main constituents Fe_2O_3: 62 to 68 mol%, ZnO: 12 to 20 mol%, and MnO substantially constituting the balance, characterized by comprising:

a compacting step for obtaining a compacted body by using a powder comprising said main constituents, wherein said powder has a specific surface area falling within a range between 2.5 and 5.0 m^2/g and a 90% particle size of 10 μm or less; and

a sintering step for sintering said compacted body obtained in said compacting step.

2. The production method of a ferrite material according to claim 1, characterized in that the 50% particle size of said powder falls within a range between 0.8 and 1.8 μm and the 10% particle size of said powder falls within a range between 0.55 and 0.73 μm.

3. The production method of a ferrite material according to claim 1, characterized in that the specific surface area of said powder falls within a range between 2.7 and 5.0 m^2/g and the 90% particle size of said powder is 5 μm or less.

4. The production method of a ferrite material according to claim 1, characterized in that said sintering step comprises:

a temperature increasing process for increasing the temperature up to a predetermined temperature, wherein a temperature range having a partial pressure range of oxygen of 4.0% or less is provided;

a temperature retention process for retaining the sintering atmosphere at said predetermined temperature; and

a temperature decreasing process subsequent to said temperature retention process.

5. The production method of a ferrite material according to claim 1, characterized in that said sintering step comprises:

a temperature retention process for retaining the sintering atmosphere in a predetermined temperature range; and

a temperature decreasing process to be carried out in a nitrogen atmosphere subsequent to said temperature retention process, wherein a slow cooling range having a cooling rate of 100°C/hr or less is set in said temperature decreasing process.

6. A production method of a ferrite material comprising as main constituents one or two of Fe_2O_3: 62 to 68 mol% and ZnO:

12 to 20 mol%, and MnO substantially constituting the balance, characterized by comprising:

a compacting step for obtaining a compacted body by using a powder comprising said main constituents; and

a sintering step for sintering said compacted body obtained in said compacting step, wherein said sintering step comprises:

a temperature increasing process for increasing the temperature up to a predetermined temperature, wherein a temperature range having a partial pressure range of oxygen of 4.0% or less is provided;

a temperature retention process for retaining the sintering atmosphere at said predetermined temperature; and

a temperature decreasing process subsequent to said temperature retention process.

7. The production method of a ferrite material according to claim 6, characterized in that the mean temperature increasing rate is 200°C/hr or less in the temperature range of 900°C or higher in said temperature increasing process.

8. The production method of a ferrite material according to claim 6 or 7, characterized in that a constant temperature range for maintaining the predetermined temperature is provided in the temperature range of 900°C or higher in said temperature increasing process.

9. A production method of a ferrite material comprising as main constituents Fe_2O_3: 62 to 68 mol%, ZnO: 12 to 20 mol%, and MnO substantially constituting the balance, characterized by comprising:

a compacting step for obtaining a compacted body by using a powder comprising said main constituents; and

a sintering step for sintering said compacted body obtained in said compacting step, wherein said sintering step comprises:

a temperature retention process for retaining the sintering atmosphere in a predetermined temperature range; and

a temperature decreasing process to be carried out in a nitrogen atmosphere subsequent to said temperature retention process, wherein

a slow cooling range having a cooling rate of 100°C/hr or less is set in said temperature decreasing process.

10. The production method of a ferrite material according to claim 9, characterized in that said slow cooling range includes a range between 1000 and 900°C.

11. The production method of a ferrite material according to any one of claims 1, 6 and 9, characterized in that said ferrite material comprises NiO: 5 mol% or less (not inclusive of 0%) and/or $LiO_{0.5}$: less than 4 mol% (not inclusive of 0).

12. The production method of a ferrite material according to any one of claims 1, 6 and 9, characterized in that said ferrite material has a saturation magnetic flux density at 100°C of 470 mT or more (measurement magnetic field: 1194 A/m), and a core loss of 1400 kW/m^3 or less (measurement conditions: 100 kHz, 200 mT).

13. The production method of a ferrite material according to any one of claims 1, 6 and 9, characterized in that said ferrite material has a volume resistivity of 0.13 Ω·m or more at room temperature.

14. The production method of a ferrite material according to any one of claims 1, 6 and 9, characterized in that in said sintering step, a screen substance is arranged to block the direct collision of the gas flow generated in the sintering atmosphere against said compacted body.

15. The production method of a ferrite material according to claim 14, characterized in that said sintering is carried out while a plurality of said compacted bodies are laminated, and said screen substance is arranged so as to surround said compacted bodies.

16. The production method of a ferrite material according to claim 14 or 15, characterized in that said screen substance

is constituted of a sintered body having substantially the same composition as that of the desired ferrite material.

17. A ferrite material characterized in that:

the ferrite material is made of a sintered body comprising as main constituents Fe_2O_3: 62 to 68 mol%, ZnO: 12 to 20 mol%, and MnO substantially constituting the balance;

the saturation magnetic flux density thereof at 100°C is 470 mT or more (measurement magnetic field: 1194 A/m); and

the volume resistivity thereof at room temperature is 0.13 Ω·m or more.

18. The ferrite material according to claim 17, characterized in that the ferrite material comprises Si and Ca as first additives in a combined content of 900 to 3000 ppm in terms of SiO_2 and $CaCO_3$, respectively, under the condition that $SiO_2/CaCO_3$ = 0.055 to 0.30.

19. The ferrite material according to claim 17, characterized in that the ferrite material comprises Si and Ca as first additives in a combined content of 1700 to 3000 ppm in terms of SiO_2 and $CaCO_3$, respectively, under the condition that $SiO_2/CaCO_3$ = 0.055 to 0.19.

20. The ferrite material according to claim 17, characterized in that said ferrite material comprises NiO: 5 mol% or less

(not inclusive of 0%) and/or $LiO_{0.5}$: less than 4 mol% (not inclusive of 0).

21. The ferrite material according to claim 17, characterized in that the core loss thereof is 1400 kW/m^3 or less (measurement conditions: 100 kHz, 200 mT), and the core loss change rate thereof is 10% or less (core loss change rate = (Pcv1 - Pcv2)/Pcv1 × 100, Pcv1: core loss before high temperature storage, Pcv2: core loss after high temperature storage, high temperature storage: 150°C × 2000 hours).

22. The ferrite material according to claim 17, characterized in that the δ value (the cation vacancy amount) in the following ferrite composition formula (1) is 0.0033 or less:

$$(Zn_a^{2+}, Ni_b^{2+}, Mn_c^{2+}, Mn_d^{3+}, Fe_e^{2+}, Fe_f^{3+})O_{4+\delta} \quad \ldots (1)$$

where $a + b + C + d + e + f = 3$, and

$\delta = a + b + c + (3/2)d + e + (3/2)f - 4$.

23. The ferrite material according to claim 17, characterized in that:

said ferrite material comprises $LiO_{0.5}$: less than 4 mol% (not inclusive of 0);

the saturation magnetic flux density thereof at 100°C is 490 mT or more (measurement magnetic field: 1194 A/m); and

the core loss thereof is 1300 kW/m^3 or less (measurement conditions: 100 kHz, 200 mT).

24. The ferrite material according to claim 17, characterized in that the ferrite material comprises as second additives, at least one selected from Nb_2O_5: 400 ppm or less (not inclusive of 0), ZrO_2: 1000 ppm or less (not inclusive of 0), Ta_2O_5 :1000 ppm or less (not inclusive of 0), In_2O_5: 1000 ppm or less (not inclusive of 0), and Ga_2O_5: 1000 ppm or less (not inclusive of 0).

25. The ferrite material according to claim 17, characterized in that the ferrite material comprises, as third additives, at least one selected from SnO_2: 10000 ppm or less (not inclusive of 0) and TiO_2: 10000 ppm or less (not inclusive of 0).

26. The ferrite material according to claim 17, characterized in that the ferrite material comprises, as fourth additives, at least one selected from a P compound: 35 ppm or less (not inclusive of 0) in terms of P, MoO_3: 1000 ppm or less (not inclusive of 0), V_2O_5: 1000 ppm or less (not inclusive of 0), GeO_2: 1000 ppm or less (not inclusive of 0), Bi_2O_3: 1000 ppm or less (not inclusive of 0), and Sb_2O_3: 3000 ppm or less (not inclusive of 0).